EP1100 Datakommunikation och datornät

2. Point-to-point links: Problems

C1. Determine the utilization of stop-and-wait ARQ assuming the following system parameters: packet size = 500 bits, bit rate =1 kb/s, link length = 500 km, propagation speed = $2x10^8$ m/s and acknowledgment (ACK) packets are 8 bytes. Processing time at the receiver can be considered negligible.

C2. Assume you have to design a window-based "Go-Back-N" protocol for a link with capacity 1 Mb/s and a one-way delay of 1,25 s. You want to achieve as high utilization of the link as possible. If each frame consists of 1000 bytes data, what is the minimum possible size (in bits) you should use for the protocol field that holds the sequence number? What will be the minimum possible size of the sequence number field if the protocol was instead a "Selective Repeat ARQ"?

C3. Code the bit sequence 11100 with a generating sequence (polynomial generator) 101.

H1. Describe the principles behind error detection with parity control and CRC. Compare the two principles and explain their advantages and disadvantages.

H2. At the receiver end the bit sequence 1110110 is received. The generating sequence used by the sender to code the message is 101. Is the message error-free at the receiver end? Show your calculations.

H3. Consider transmission of frames with length 10000 bits over a 1 Mbps satellite channel with length of 75 000 km. Calculate the maximum link utilization when you use the following flow control schemes. Ignore errors and assume that the propagation speed is 3×10^8 m/s:

a) Stop-and-wait ARQ
b) Go-back-N with window size 7
c) Go-back-N with window size 127

H4. A channel has data rate of 4 kbps and propagation delay of 20 ms. What is the frame size for which a stop-and-wait scheme provides at least 50% efficiency?